

Phosphate...

Nature's Gift to Nature

It was about four and a half billion years ago that the earth began to take shape, through million-year periods of developments which witnessed the creation of oceans, rivers, lakes, mountains, canyons, deserts, swamps...and the minerals of the earth.

One of the numerous mineral gifts of nature is the huge, multi-million-ton deposit of phosphate rock which lies beneath up to 100 feet of limestone and shale under a 20-square-mile area north of Vernal, Utah.

The 18-foot-thick layer of phosphate rock is composed mostly of clay, sand and phosphorus minerals, left behind when the waters of a vast inland sea receded about 136 million years ago.

Phosphorus is essential to all forms of life, and is a critical component in the stimulation of early plant growth, root formation, the hastening of maturity in plants and the promotion of seed production.

Although phosphate fertilizers are recognized throughout the world as one of agriculture's most important and beneficial tools, it wasn't discovered as such until 1842 in England when phosphate rock was treated with sulfuric acid to produce a fertilizer readily soluble in water.

Phosphate and its various derivatives have other beneficial uses, too, in soft drinks, pickling, pharmaceuticals, denture cements, textiles, lithography, jellies and sugars.

Yes, phosphate truly is nature's gift to nature.



Vernal Phosphate Operations



Chevron Resources Company

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April, 1982



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An Inside Look

In December, 1980 Chevron Resources Company accepted the numerous challenges and responsibilities associated with the 20-year-old phosphate mining and ore processing facility north of Vernal, Utah.

To establish a long-range, cost-efficient operation of the massive multi-million ton phosphate ore deposit, a totally new mining plan has been developed to assure the orderly extraction of phosphate minerals, and the orderly restoration of the land following mining operations.

Chevron has retained a firm which specializes in land reclamation, restoration and revegetation to assist in professional land management of the Vernal Phosphate Operations, since the company is extremely concerned about environmental preservation.

Chevron management determined that the excessive dust problems caused by the original crushing and ore handling facilities would have to be eliminated. Therefore, a totally new, dust-free process was designed and is being installed.

Since much of the ore processing equipment was worn out after 20 years of use, and was too small to comply with new Chevron objectives, major changes in equipment and technology have been installed at the phosphate concentrating plant.

During 1981, Chevron Resources Company met these and other challenges squarely with an injection of capital investment, new engineering, new equipment, selected management and supervisory specialists to augment existing veteran personnel, and a corporate philosophy dedicated to establishing a totally professional mining operation with sincere concerns for safety and environmental protection.

In addition to the immediate, extensive modifications already initiated by Chevron, the company also has developed major long-range plans for the Vernal Phosphate Operations, such as the purchase of a large dragline for mining operations and the expansion of concentrator facilities. The timing of such major projects will be predicated upon economic and market conditions. However, Chevron hopes to have the dragline operational by 1985.

We have projected an increase in phosphate concentrate production capacity from about 450,000 tons a year to approximately 750,000 tons during 1982. By 1986, our plans call for the production capacity of approximately 2,000,000 tons of concentrates annually.

Chevron is fully committed to protecting and preserving the environment of the mining area. For example, the company will not mine the several million tons of phosphate ore which is part of the reserve, but which lies along the north and east rim of Brush Creek Gorge in an area dedicated by the company as a buffer zone to preserve the esthetic beauty of the Gorge.

There are numerous other examples of how Chevron Resources Company is carefully planning the future of Vernal Phosphate Operations, but, one important underlying factor is Chevron's sincere determination to be the finest industrial enterprise in the growing Vernal area, and to be a most respected corporate citizen.

When circumstances and conditions permit during 1982, the citizens of the Vernal area will be invited to tour the new Vernal Phosphate Operations and see firsthand how phosphate rock is mined and processed to provide one of man's most important compounds... phosphate fertilizers.

How Phosphate Ore is Mined

Briefly, this is how mining operations are conducted by Chevron Resources Company's Vernal Phosphate Operations at the present time. The procedure will change with expansion of operations.

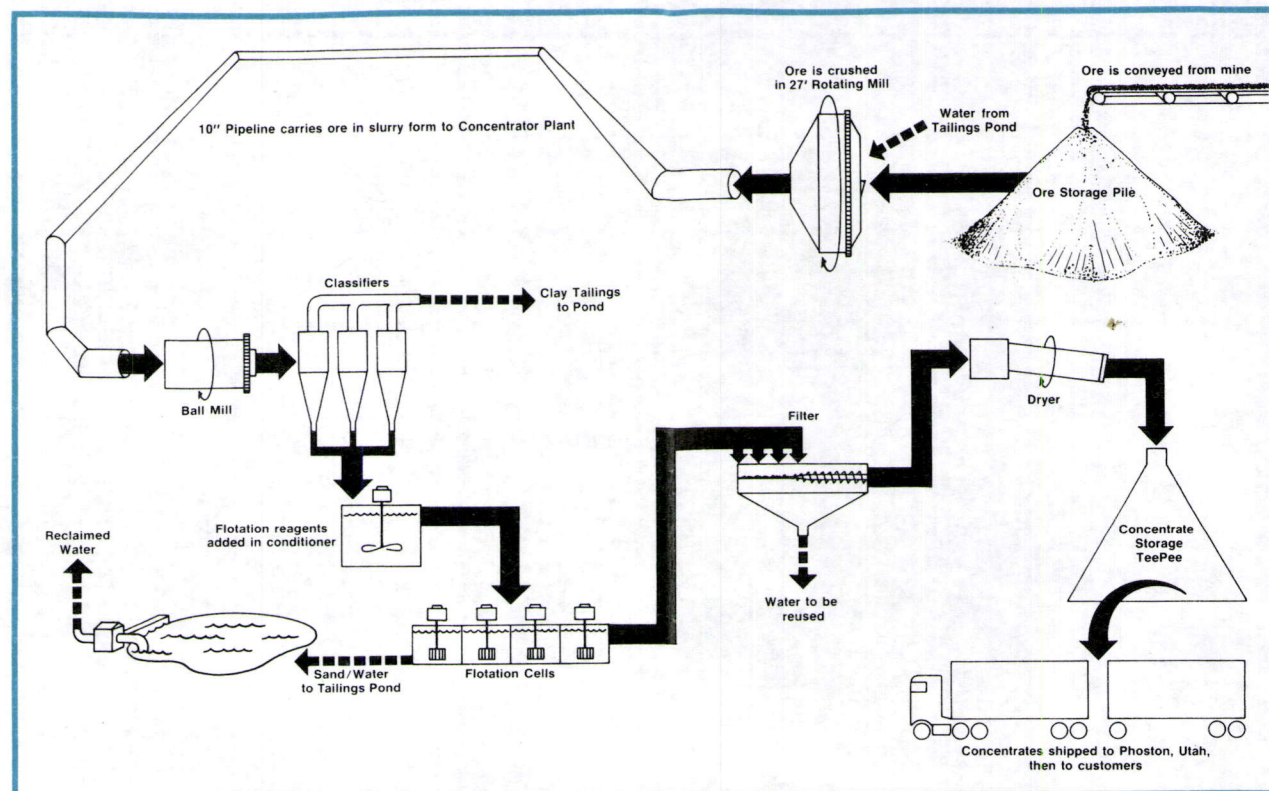
Areas to be mined are first cleared of existing vegetation by bulldozers (1), and the top soil is removed by large scrapers (2) and stored for later use in land reclamation (3).

Beneath the top soil is a layer of rocky material up to 100 feet thick known as overburden which covers the phosphate ore zone.

A pattern of holes is drilled through the overburden layer (4), filled with explosives and then blasted (5) to break up the ground for removal by huge dozers (6), which push the material into previously mined areas (7).

After the overburden is removed, a small drill (8) penetrates 18 feet into the ore zone with a pattern of holes which are blasted (9). The broken ore next is removed by loaders (10) and fed into a portable crusher (11) which reduces the ore to twelve inches or less in size to be fed onto a moveable conveyor (12), which subsequently connects with a permanent conveyor leading to the primary crushing/grinding mill.

Meanwhile, land restoration, reclamation and revegetation take place in previously mined-out areas with dozers (13) contouring the terrain, using overburden material and top soil, and a tractor-seeder (14) operation, bringing new plant life to the terrain.



Phosphate Ore Concentrating

Ore from the mine is piled adjacent to the newly installed SAG Mill (semi-autogenous grinding mill), and is reclaimed by a conveyor to the mill which reduces the ore from about twelve inches in diameter to a consistency of sand. Previous excessive dust problems from ore crushing have been eliminated with the new crushing/grinding process and the addition of water reclaimed from the tailings pond.

Once the ore has been ground, it is carried to the concentrator plant through an 8,000-foot slurry pipeline. The next stage of processing occurs when the coarser ore is ground in a ball mill, which reduces the material to the consistency of fine sand. Still in a slurry form, the ore passes through a series of cyclone classifiers, where phosphate and sand are separated from very fine clay materials

Meanwhile, the ore continues to be upgraded as it passes through a series of flotation cells, where various reagents are added, and where the phosphate minerals are separated from sands, which are pumped to the tailings pond.

After the phosphate minerals have been separated from clay and sand residues, the phosphate is dewatered and filtered before being sent to a large rotary dryer, the final stage in processing.

The dried phosphate ore concentrate next is stored in covered TeePee structures before being transported by truck to Phoston, Utah for subsequent loading into rail cars for shipment to customers.

Phosphate Ore Mining

